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USER PRIORITIZATION OF CAPABILITIES FOR A FUTURE INTEGRATED HEADBORNE SYSTEM

by
Dean-Michael Sutherland
and
Raymond Spring

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14. ABSTRACT

The Headborne Integrated Technology Team was formed to investigate and recommend a future system, with integrated capabilities, for the dismounted infantryman. The term 'dismounted infantryman' will refer to both Marine Corps and Army personnel. The system is targeted for development in the 2010-2015 timeframe. This report will focus on the first step in this effort - prioritizing capabilities for integration. The prioritized headborne capability list produced will serve as a support tool in a complex tradeoff analysis in the second step and also decision-makers in planning further research investment and determining which capabilities to monitor. The prioritized list produced was based on the results of 123 surveys completed by Army and Marine officers attending the US Army Infantry Officer Advanced Course at Fort Benning, Georgia.

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Preface

This report describes the efforts made by the Headborne Integrated Technology Team to produce a prioritized capabilities list to be used in the development of a future headborne integrated system as desired by dismounted infantrymen. The work was conducted from January to September 2000 under project number 109AAA This effort was funded as a United States Army Soldier and Biological Chemical Command, Natick Soldier Center FY00-01 Work Unit.

USER PRIORITIZATION OF CAPABILITIES FOR A FUTURE INTEGRATED HEADBORNE SYSTEM

Executive Summary

This report describes the work done in prioritizing potential capabilities for integration into a future headborne integrated system being developed for the dismounted infantryman in support of the Headborne Integrated Technology Team. The prioritized list was based on the results of 123 surveys completed by officers attending the US Army Infantry Officer Advanced Course. Some of these officers were Marines, which was important because the future headborne system is being designed so that it will be applicable to dismounted infantrymen in the United States Army or Marine Corps.

The prioritized capability list is primarily intended to be a tool for decision-makers to facilitate a complex tradeoff analysis required in the next step of the development of the future headborne integrated system. It can also be used for research investment and technology monitoring decisions.

Table 1 presents the final capability prioritization list resulting from this effort.

Table 1. Final Capability Prioritization List

Level	Capability	Sub-Level	Preference
I	Night Vision Device Intra-squad Communications	A	Very Strong
	Ballistic Protection Thermal Sight Global Positioning System (GPS)	B	Strong
II	Identification, Friend or Foe (IFF) Range Finder NBC Protection		Average
III	Digital Compass Visual Display Eye Laser Protection Daylight/Video Camera Signature Reduction Facial Protection	A	Some
	Auditory Display Laser Detection	B	Low

In Table 1, Level I represented capabilities the user preferred the most, because they significantly increased operational effectiveness or provided desired protection. In particular, the top prioritized capabilities related to operational effectiveness appear to address the top user needs, awareness of where friendly and opposing forces are, as defined in an operational capability analysis conducted by the Future Warrior Architecture Team. Level II were the capabilities the user had some preference for, but not as strongly as Level I capabilities. Level III were the capabilities that user preferred

the least. In summary, the user preferred to have capabilities in Level I before Level II or III, and then Level II before Level III.

Level I and III are also divided into sub-Levels, which represent more defined ranges within these Levels. Sub-Level IA are the capabilities preferred the most among Level I capabilities, and sub-Level IIIB are the capabilities preferred the least among Level III capabilities.

The results of this prioritization effort appear to be very reasonable and are supported by foreign studies and a recent After Action Report from two Land Warrior European Demonstrations.

Introduction

The Headborne Integrated Technology (HIT) Team was formed to investigate and recommend a future headborne system, with integrated capabilities, for the dismounted infantryman. The term 'dismounted infantryman' will refer to both Marine Corps and Army personnel. The system is targeted for development in the 2010-2015 timeframe.

This paper will focus on the first step in this effort, prioritizing capabilities for integration into the dismounted infantryman future headborne system. The prioritized headborne capability list produced will serve as a support tool in a complex tradeoff analysis in the second step and also aid decision-makers in planning further research investment and determining which capabilities to monitor.

The future integrated headborne system is to be a sub-element of a complete system, the Future Warrior System, which will be the successor to the Land Warrior System. This report will provide details on the methodology established and followed to generate a prioritized headborne capabilities list. The list produced will then serve as the basis for a tradeoff analysis. This tradeoff analysis will be conducted by decision-makers, such as users, program managers, designers and developers, with the objective of minimizing weight, power/energy and cost while improving soldier fightability. The tradeoff analysis will not be discussed in this report.

Background

In Fiscal Year (FY) 1994, the Future Warrior Architecture - Infantry (FWA-I) Team was established and tasked with investigating new and potential technologies for the dismounted infantryman to be incorporated into a Future Warrior system for fielding in the 2010-2015 timeframe. This system would incorporate new technologies and concepts to optimize or exceed Land Warrior (LW) requirements and provide operational enhancements, while also:

- reducing weight and thus increasing tactical mobility;
- reducing power/energy needs by reducing weight, volume and life cycle cost;
- reducing cost through increased rate of deployment and force coverage with a goal of 35% reduction in LW/Force XXI LW Design-to-Unit Production Cost; and
- improving fightability through increased combat effectiveness and interoperability requirements.

The FWA-I Team had such a broad array of areas to focus on that smaller groups were formed to work on specific components of the total system. One such group, the Future Headborne Equipment Group (FHEG), specifically focused on evaluating components that could be part of the head-worn or helmet-mounted system in order to recommend a headborne design concept. In 1999, the FWA-I Team ended its work. At this time, the FHEG's work had resulted in a 'probable' headborne system planned for fielding in 2010, and with an 'ideal' system possibly ready in the 2020-2030 timeframe.

In fiscal year 2000, the Headborne Integrated Technology Team was created to continue the work of the FHEG. The HIT Team was specifically tasked with:

1. optimizing integrated headborne equipment module design concepts to reduce overall Warrior System program development risk, cost, and schedule;
2. iteratively, analyze, design, model, and fabricate pre-prototype concepts; and
3. conduct bench tests, evaluate and select concepts.

Review of Previous Efforts

All of the work completed by the FWA-I effort was reviewed before the HIT Team decided on the methodology it was going to apply to accomplish its goals. As part of the FWA-I effort, several trade studies were conducted. These focused on assessing new technologies and concepts that provided a needed capability, while not replacing existing equipment. These studies assessed a number of alternative components that provided a specific capability and pre-selected combinations of these components.

Two items significant to the HIT Team were noted after reviewing the FWA-I trade studies. First, the studies focused on finding technologies, which met a required need or capability as defined by an operational capability analysis using soldier proponents: program managers, staff officers, and users. This analysis had these individuals completing a capability matrix desired by FY2010 across combat domains. The top needs obtained from this analysis we were:

- Awareness of Where Friendly Forces Are;
- Awareness of Where Opposing Forces Are;
- Identify Friend or Foe; and
- First Round Kill.

These required needs were usually broad in definition (i.e. 'awareness of where friendly forces are'). For purposes of this prioritization effort, more specific capabilities had to be defined, such as having a night vision device to determine where enemy forces were after sundown. The individuals who took this capability analysis were equally distributed between the proponents and thus the needs generated were not solely user selected.

Second, the headborne equipment combinations assessed did not consist of different combinations of the top alternatives obtained from the specific capability trade studies, but rather combinations of all the alternatives. For example, the highest scoring headborne equipment combination used the lowest scoring auditory display component alternative and did not differentiate between sensor components. Although these trade studies had limited value in prioritizing more specific capabilities, they did furnish valuable information in guiding this effort, such as having established some minimum technical requirements and influencing survey construction.

In addition to the information obtained from FWA-I work, some members of the HIT Team had been part of a previous effort, a Mini Front End Analysis (FEA), on helmet-borne capabilities. Although this Mini FEA was on helmet-borne capabilities, the

results were general enough to be applicable to headborne capabilities. This Mini FEA consisted of a survey on desired performance characteristics and information needs completed by a group of individuals, comprised of primarily individuals in soldier proponent offices, and analyzed using Expert Choice®. Because of the make-up of the respondents, most of the information generated in the Mini FEA was geared to aid decision-makers in possible tradeoff analyses and not specifically prioritize capabilities. The respondents consisted of both Army and Marine Corps personnel.

The Mini FEA resulted in the following prioritization of Performance Factors: Weight (31% most important), Reliability (30%), Capabilities (19%), MANPRINT (14%), and Volume (6%). 'Capabilities' was divided and ranked as follows: Ballistic Protection (30%), Helmet Stability (16%), Comfort (15%), Targeting (13%), Head Mounted Display (HMD) Information + Communication (14%), and Other (13%).

The raw data from this survey were taken and statistically analyzed to gain more insights into the results. Also, this Mini FEA had two important points that were noted. One, no background information existed for the individuals who completed the survey, all that was known was what program offices these individuals worked in. The results of this FEA would have been much more pertinent to the prioritization effort if information regarding the level of infantry experience of these individuals had been known.

Two, the Mini FEA had both soldier and Marine feedback, which allowed determination of their correlation. A statistical analysis was conducted on this. It showed that no significant difference existed between the feedback from the Army and Marine Corps. This meant that any feedback obtained from one group was valid for both, which was especially important because the future integrated headborne system was intended for both soldiers and Marines. This would simplify data collection, although efforts would continue to be made to include both groups.

Methodology

Based upon the FWA-I and Mini FEA work, the HIT Team decided that to meet its objectives it was necessary to divide its work into a four-step process. First, obtain distinctly dismounted infantrymen feedback on which capabilities were most wanted and produce a prioritized capability list from this feedback. In this first step, feedback was gathered exclusively in terms of capabilities, such as how important was it to have a night vision capability, and not on how to implement this capability, such as whether to use goggles. In the second step, alternative methods of achieving a specific capability for each prioritized capability will be studied and rated based upon schedule, cost and performance tradeoffs.

The raters in the second step will consist of soldier proponents and subject matter experts (SME), such as infantry users, program managers, designers, and developers. Using their input, the prioritization list from the first step could be modified in consideration of these tradeoffs. For example, if after the first step the thermal sighting capability was rated more important than the daylight video capability, in the second step

these could be reversed because of cost and schedule tradeoffs. When this modified prioritization list has been completed, the next step will have the designers and developers build prototypes. These prototypes will consist of combinations of the top rated methods of providing a capability (i.e., the #2 rated visual display with the #2 auditory display). During the construction of these prototypes, the designers and developers will solve integration issues while maintaining user involvement. The appropriate program manager will then down select prototypes. The final step would be to perform a technology risk analysis on the down selected prototypes.

These four steps or tasks can be summarized as:

1) prioritize headborne capabilities;
2) optimize design concept tradeoffs;
3) produce pre-prototype headborne module concepts; and
4) perform a technology risk analysis.

To reiterate, this report describes the work done to complete the first step only.

The first priority was to develop a methodology for prioritizing headborne capabilities. Planning backwards from a final prioritized capability list, the requirements to complete each preceding step were collected. Reversing the order of the collected information provided the methodology.

The methodology developed consisted of the following:

- review the previous work done on a future headborne system;
- research previous head platform studies;
- investigate potential capabilities;
- select survey respondents;
- construct the survey;
- secure feedback's raw data;
- statistically analyze raw data;
- produce prioritized capabilities list; and
- document effort.

Previous Head Platform Studies

No studies existed that examined future headborne systems specifically for the dismounted infantryman, although there were studies for pilot and combat vehicle crewmen helmet systems. These studies did contribute material pertinent to this effort. In particular, a report, "Helmet Concept Alternatives For Combat Vehicle Crewmen," by Jeffrey A. Manickas of Natick Soldier Center provided a methodology very similar to the one developed for this effort. Comparing the two methodologies and identifying any discrepancies eliminated gaps in this effort's methodology. It also highlighted non-obvious tradeoff considerations such as compatibility with various weapon systems, which would be incorporated into the HIT Team's second step, a tradeoff analysis.

In addition to these studies, some foreign studies were found that evaluated their particular future soldier system. Of significant value were several Australian reports. These reports pointed out additional potential capabilities and reinforced information found in the FWA-I's work. The conclusions of these Australian reports were collected and saved for comparison with our prioritization list produced by the survey, and for input into the second step's tradeoff analysis.

Potential Capabilities Investigation

For a comprehensive prioritization list to be produced from the proposed prioritization survey's feedback, a complete and exhaustive list of all potential capabilities, which could be integrated into the future headborne system, had to be presented for rating. This involved researching a number of sources. Some sources provided input on potential capabilities, and others supplied information on whether certain capabilities would be mature enough for integration.

The United States Army Training and Documentation Command's (TRADOC) list of Future Operational Capabilities (FOCs) served as the foundation for the survey's prioritization list. The FOCs were reviewed and those applicable to the dismounted infantryman were selected. These applicable FOCs were then pared down based on their suitability for a headborne platform. For example, ballistic protection for the neck was eliminated because it was concluded this was a body armor vest issue. Additional capabilities, not in the FOCs, were obtained from the FHEG trade studies, the Land Warrior Program, the Advanced Warfighting Experiment, and Military Operations in Urban Terrain Advanced Concept Demonstration. Compiling all of the capabilities, a tailored list of potential capabilities for integration was created.

Using other sources, more detailed information was gathered for each capability on the created list. Literature and Internet searches, scientists, and evaluations of foreign and US future warrior systems were used for this. Analyzing the detailed information and the tailored list of capabilities, more capabilities were eliminated because they were not appropriate for the user to prioritize, since they involved issues that the designers and developers would address. For example, the Power Source and Accessories FOC, which stated the objective capability for the individual soldier "will be a universal power source that provides simultaneous power to any/all soldier carried systems/subsystems without degradation." The user would be primarily interested in having a specific capability, not how it was powered, although he or she would be concerned about the weight of a power source. The various methods of furnishing power and their weight would be considered in the second step's tradeoff analysis.

In addition, a great deal of information was assembled during the capabilities investigation that would be useful in the tradeoff analysis of the future integrated headborne system, such as compatibility/interface issues and the design/development phases, i.e., potential power sources.

Selection of Survey Respondents

Because the specific goal was to obtain dismounted infantryman feedback, it had to be ensured that infantrymen made up the pool of survey respondents. The ideal goal of the feedback was to obtain 'what' was wanted, not 'how' to provide it, from users who were current with field needs. Previous efforts gathered feedback from individuals with unknown, less current or no infantry field experience, who were usually staff officers assigned to program offices. Feedback from these efforts was targeted at general issues (i.e., cost, weight) where infantry needs were not the only issues considered. In addition, it was assumed that these individuals incorporated biases into the feedback because of beliefs formed on what they believed the dismounted infantryman needed or by their background since their infantry experience.

The feedback these individuals provided was useful, but at a broader or 'bigger picture' level. These individuals were concerned with more encompassing issues that would be important for prioritizing the complete future warrior system, of which the integrated headborne system was only one part. This feedback would be more relevant for the future system's tradeoff analysis.

Several methods of obtaining a group of infantryman for the survey were analyzed. A group from the same unit could be surveyed, but it was anticipated there might be a correlation between the ratings from the individuals because of unit culture, leadership influence, or experience. In addition, enlisted individuals, not including non-commissioned officers (NCOs), from different units were looked at. This method also was of concern, because these individuals were not in positions where most of the surveyed capabilities were fully applicable to them.

After eliminating enlisted infantryman, NCOs and commissioned officers remained, who could provide the kind of feedback desired. It was decided to obtain infantry officer feedback, because they probably would have a greater range of dismounted infantryman functions. Students in the US Army Infantry Officer Advance Course (IOAC) at the US Army Infantry Center in Fort Benning were targeted as the ideal pool of respondents. These students were all infantry officers with several years of experience and from a broad spectrum of infantry type units (i.e., airborne, light) with different backgrounds.

Once the IOAC was selected, Don Billoni, a civilian with the United States Army Materiel Command/United States Army Infantry Center Liaison Office, was contacted to assist in coordinating the survey. He provided details on the manner the course was structured. Each class was divided into teams with a cadre member assigned to each team. Teams had different schedules and only a few minutes of free time available. This was not conducive to having the HIT Team conduct the surveys in person. Instead, Mr. Billoni suggested that cadre members be gathered and informed as to the purpose of the survey and suggesting how they could be completed by having each cadre member arrange time for his team to complete their surveys. This approach was accepted.

Survey Construction

Using the information gained during the previous steps of this effort, a list of capabilities was assembled that feedback was desired on. These capabilities had to be defined in broad terms such as what the capability would provide the user, so they did not point to a specific solution, e.g., 'what' the user wanted, not 'how' to provide it. This was in keeping with the survey's goal; prioritizing capabilities desired by the dismounted infantryman for integration into a headborne system.

An additional factor was a limitation on the time available for the respondents at the Officer Advanced Course to take and complete the survey. Because almost 20 capabilities were to be rated, certain rating methods did not lend themselves to completion in the time allotted. The method chosen allowed the gathering of feedback on a form that permitted a thorough analysis.

The survey format listed all the capabilities which were to be rated and ranked, followed by a general description of what the capability would provide to the user. First, the respondent was asked to rate these capabilities into three tiers based on their impact for the dismounted infantryman. The tier ratings are:

A - this capability will have a significant impact on performance,
B - the capability will have some impact on performance, and
C - the capability will have a slight impact on performance.

Once this was complete, the capabilities would be ranked in order starting at 1 within each tier. Having a tier rating and order ranking for each capability would allow more information to be extracted from the raw feedback. (To minimize confusion for the reader, 'rate' will refer to the score for a tier, and 'rank' will refer to the order given a capability within a tier.) Also, as part of the survey, background information was gathered with each survey. This information provided additional criteria for use in the raw data's analysis.

Two infantry officers, at SBCCOM Natick reviewed the finalized survey for completeness and comprehensiveness. Some minor changes were made to more precisely define some of the capabilities. The finished survey is provided in Appendix A.

Survey Analysis

Students at the IOAC completed the prioritization surveys the week of 7-11 August 2000. A total of 123 surveys were completed. The raw data from these surveys were then converted to electronic spreadsheet format.

Using the raw data generated, a decision analysis support tool was developed to produce a prioritized capability list. This decision analysis support tool was set up so that a point score for each capability would be calculated by multiplying its tier rating and order ranking. A weight was given to each tier rating. Tier A was given a weight of 1 (A=1). Tier B was given a weight of 20 (B=20), to ensure that if someone rated all 16 capabilities in Tier A, someone else's Tier B rank 1 would still be lower than the Tier A rank 16. In addition, the points calculated for a Tier A rank 16 were 80% of those for a Tier B rank 1. Maintaining this ratio for continuity, Tier C was given a weight of 400 (C=400). The rankings within each tier remained the same.

The point scores would be totaled for each capability. The lower (closer to zero) a capability scored the higher its priority (e.g., the user desired more). The capability with the lowest total point score would represent the top prioritized capability. This was done so that continuity between the support tool and prioritization survey would be maintained, because the surveys had been completed with the capabilities placed in priority order #1, #2, #3, ... The resultant list of total points for each capability would then be placed in ascending order, from top to bottom priority.

Some of the survey data had to be edited to permit the decision analysis support tool to function properly. For example, some respondents ranked the capabilities from 1 to 16 and not within a tier, and others rated a capability Tier D. These were corrected by providing the 1 to 16 rankings with tier A ratings, and converting Tier D ratings to Tier C ratings with rankings the next lower from the original Tier C rankings. These measures allowed 14 surveys to be corrected.

To prevent potential bias on our part, any survey that was not completed correctly and had missing data, which could not be corrected or imputed, was conditionally eliminated from the decision analysis support tool's raw data. The survey's missing tier ratings were eliminated completely from the raw data. Those surveys missing some rankings had all their rankings deleted, so that the decision analysis support tool could still use them for a tier rating analysis. Four surveys were eliminated completely from the raw data and twenty-one others had their rankings deleted. One other survey was eliminated because the respondent was an officer from Thailand.

The decision analysis support tool was then used to determine the prioritization of the capabilities. The total points each capability received were calculated and the standard deviation of this value determined. In addition, tier ratings were analyzed. The average tier rating was computed with its' standard deviation. The number of surveys used for this was greater than the number used for point scores, because as explained in the preceding paragraph several of the surveys had their rankings eliminated.

Although the decision analysis support tool was set up to incorporate the tier ratings into the point calculation, it was decided to investigate also the tier ratings alone. Using just tier ratings permitted the inclusion of surveys, which had been eliminated from the totals points calculations for reasons described earlier, and thus increased the population size. This would provide additional quantitative information to aid in the creation of the prioritized capability list. For example, a capability tier A could score a 100 points less than a capability tier B with both having confidence intervals of 75 points. Because their confidence intervals overlapped, these two capabilities could theoretically be switched in order. By conducting the tier rating analysis, more information would be produced to base prioritization order decisions on, i.e., capability A and B having average tier ratings of 1.9 and 2.3, respectively. Using the average tier rating, capability A would be determined to be a higher priority than B.

Initially, all the students at the Infantry Officer Advanced Course were considered as one group. It had been assumed that if an individual was a student at the Infantry Officer Advanced Course, then he was an infantryman with a position that was in either an infantry or an infantry support role as defined by Military Occupational Specialty (MOS) 11 for the Army.

Examples of MOS 11 positions were platoon leaders for rifle, anti-tank, mortar, or mechanized platoons. Based on a review of the information obtained from the respondents, the assumption all the respondents were MOS 11 was false. In addition to the MOS 11s, there were USMC members and non-MOS 11s. In actuality, IOAC students were individuals that required a core knowledge of infantry tactics, techniques and procedures to perform their duties.

Those, who were MOS 11, were placed into one group. The non-MOS 11s respondents were grouped together, and the two USMC officers there were formed into another group. Having Marines was important, because it allowed the correlation between US Marine Corps and US Army users to be investigated. The non-MOS 11 respondents had combat support functions, i.e., Combat Engineers and Forward Observers, or were Special Forces. The Special Forces respondents, MOS 18, were grouped separately from the other non-MOS 11s, because of their cross-functional training. An individual in Special Forces has a MOS 18 designation, but can still retain their MOS from before they were Special Forces, such as MOS 11.

The focus of the survey analysis was to be only the USMC and MOS 11 groups. However, it was decided to also investigate the non-MOS 11s, because these individuals would use the future integrated headborne system as well. In addition, there were a few respondents who did not indicate what their MOS was and thus were not placed into any of the defined groups. The four groups (all IOAC, MOS 11, USMC, and non-MOS 11) were then classified as primary groups for analysis purposes.

An additional three groups (secondary groups) were selected for study composed of students with 75th Ranger Battalion, Special Forces, or combat/ peacekeeping

experience. Table 2 provides descriptions of all the groups. All of the secondary groups consisted of respondents from the various primary groups. The secondary groups were selected for investigation to furnish more information to help explain the results generated from the primary groups, and to see if any and what kind of differences existed between them and the primary groups.

Table 2. Group Descriptions

Primary
All IOAC – all students attending the US Infantry Officer Advanced Course.
MOS 11 - their mission is to lead units of infantrymen and close with the enemy by means of fire and maneuver to defeat or capture him, or to repel his assault by fire, close combat, and counterattack. They are designated with MOS 11.
USMC - Marines are trained, organized, and equipped for offensive amphibious employment and as a "force in readiness."
Non-MOS 11 – Combat Engineers, Forward Observers. Individuals that are along side frontline infantry units providing specialized support (combat engineers) or coordination with their components (forward observers). All non-MOS 11s, except MOS 18.
Secondary
Special Forces – as a Special Operations unit, their mission is to plan, prepare for, and, when directed, deploy to conduct unconventional warfare, foreign internal defense, special reconnaissance and direct actions in support of U.S. National Policy objectives within designated areas of responsibility. Primarily they are teachers, cross-functionally trained. They are designated with MOS 18.
Rangers – as a Special Operations unit, their mission is special light infantry operations. These include attacks to temporarily seize and secure key objectives and other light infantry operations requiring unique capabilities. They are designated with MOS 11.
Combat/Peacekeeping – respondents that were involved in combat or peacekeeping operations.

After completing the analysis for all respondents, the process was repeated for the groups of respondents that fit the selected criteria, as defined previously. The following groups, with the numbers representing the number used for the total point and average tier rating calculations, respectively, were selected and analyzed:

Primary Groups	# Used for Total Points	# Used for Average Tier Rating
• US Army Infantry Officer Advanced Course students	97	118
• MOS 11	69	88
• USMC	2	2
• non-MOS 11 (except MOS-18)	17	19
Secondary Groups		
• Special Forces (MOS 18)	3	6
• 75th Ranger Battalion experience	6	8
• Combat/Peacekeeping experience	12	21

Note: 9 surveys were not placed in a group because they had undefined MOSs

After the preliminary results were produced, further statistical analysis was conducted to determine if correlations existed between groups and/or the order certain capabilities were placed in. Also, the statistical analysis provided information on any surveys that produced outliers.

Results

The total point scores and average tier ratings were calculated for each group and are shown in Figures 1-7. Part A of each figure shows the total point score for each capability in ascending order of total points or decreasing priority from left to right. Part B shows the average tier rating for each capability in the same order as Part A. Below are each figure and the group it represents:

Figure 1 – All IOAC,
Figure 2 - MOS 11,
Figure 3 - USMC,
Figure 4 - non-MOS 11 (except MOS 18),
Figure 5 - Special Forces (MOS 18),
Figure 6 - 75th Ranger Battalion experience, and
Figure 7 – Combat/Peacekeeping experience.

Capability Acronyms are as follows:

IFF - Identification, Friend or Foe
GPS – Global Positioning System
NBC – Nuclear, Biological, and Chemical

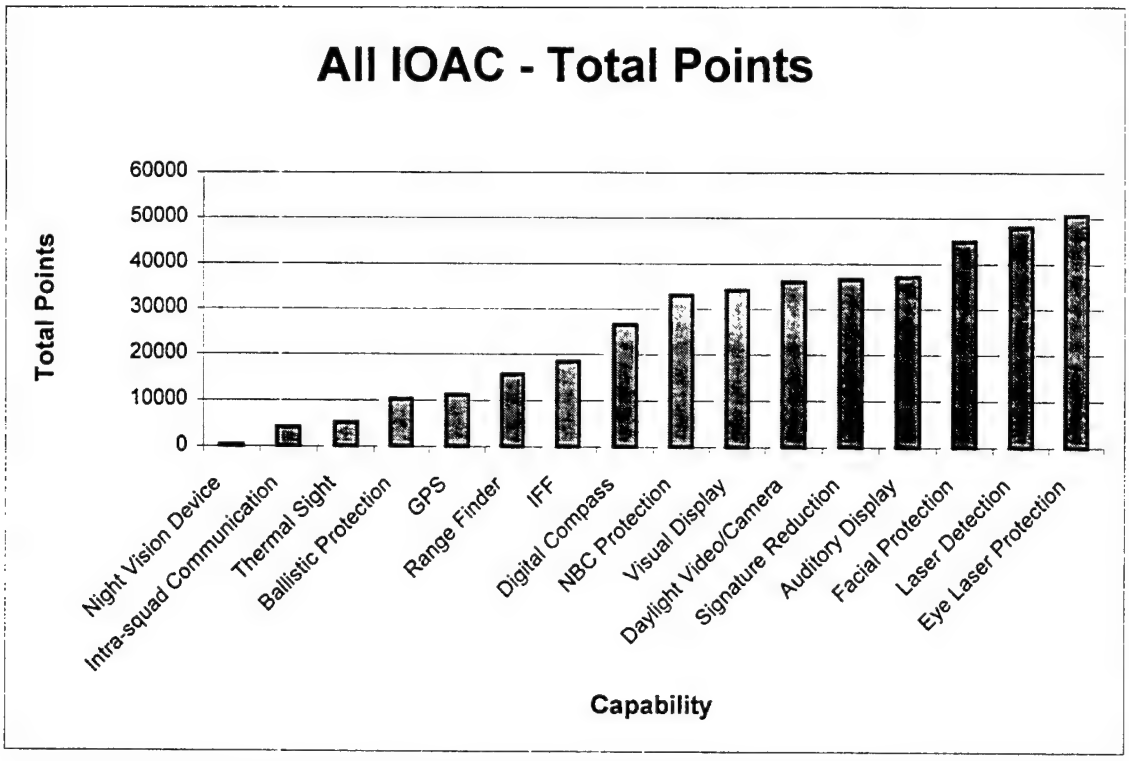

Figure 1-A. Total Points for All IOAC Respondents.

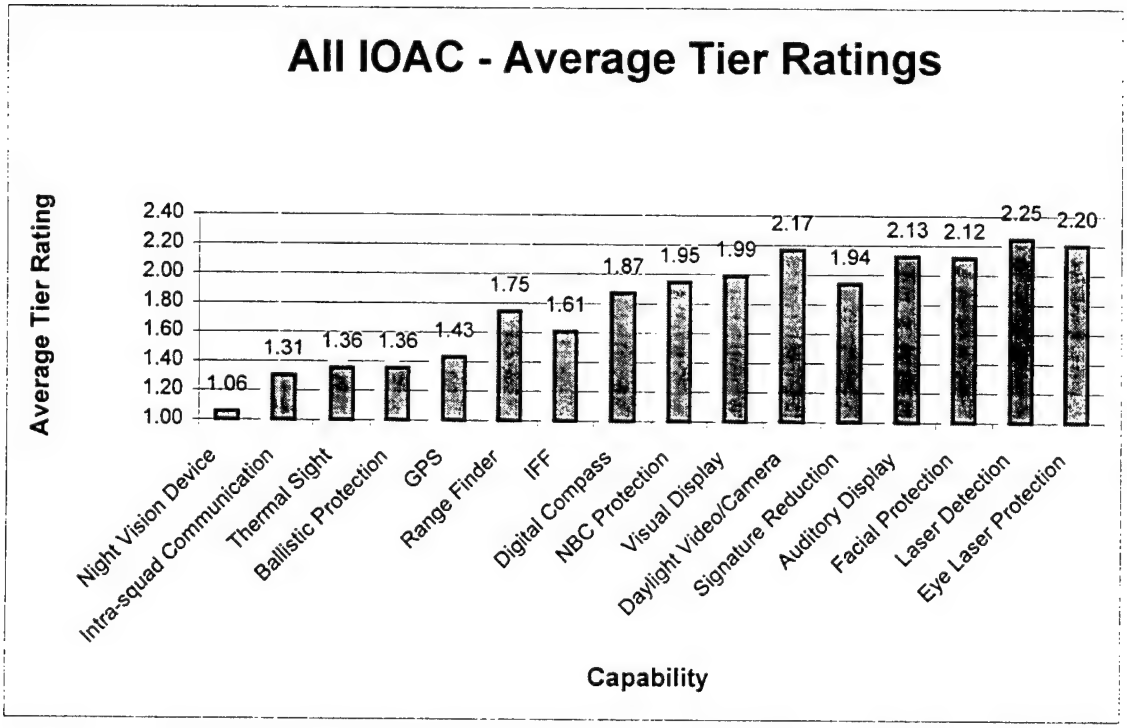

Figure 1-B. Average Tier Ratings for All IOAC Respondents.

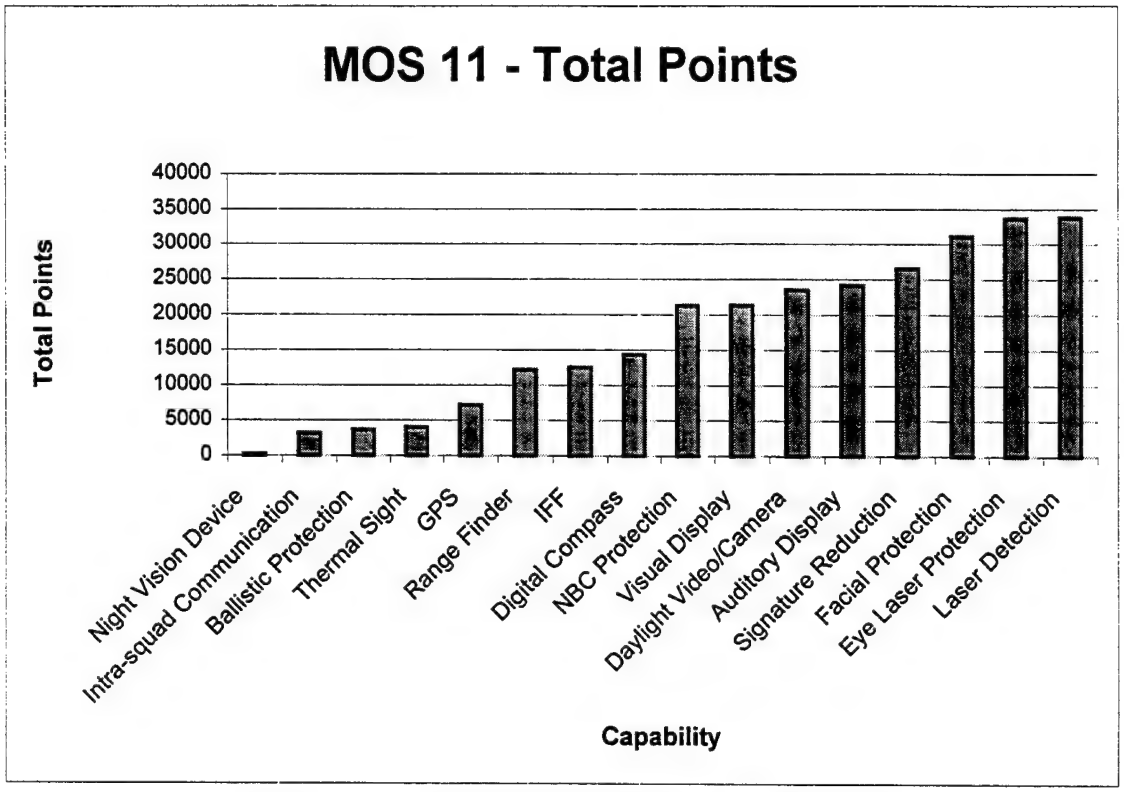

Figure 2-A. Total Points for MOS 11 Respondents.

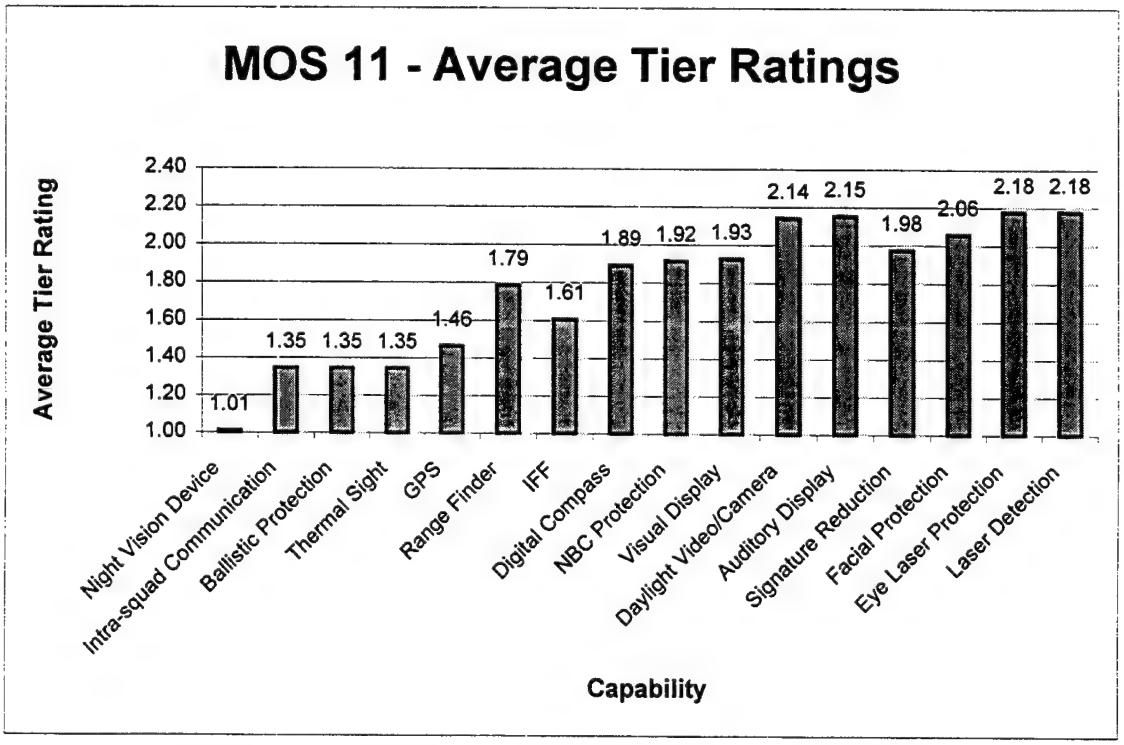

Figure 2-B. Average Tier Ratings for MOS 11 Respondents.

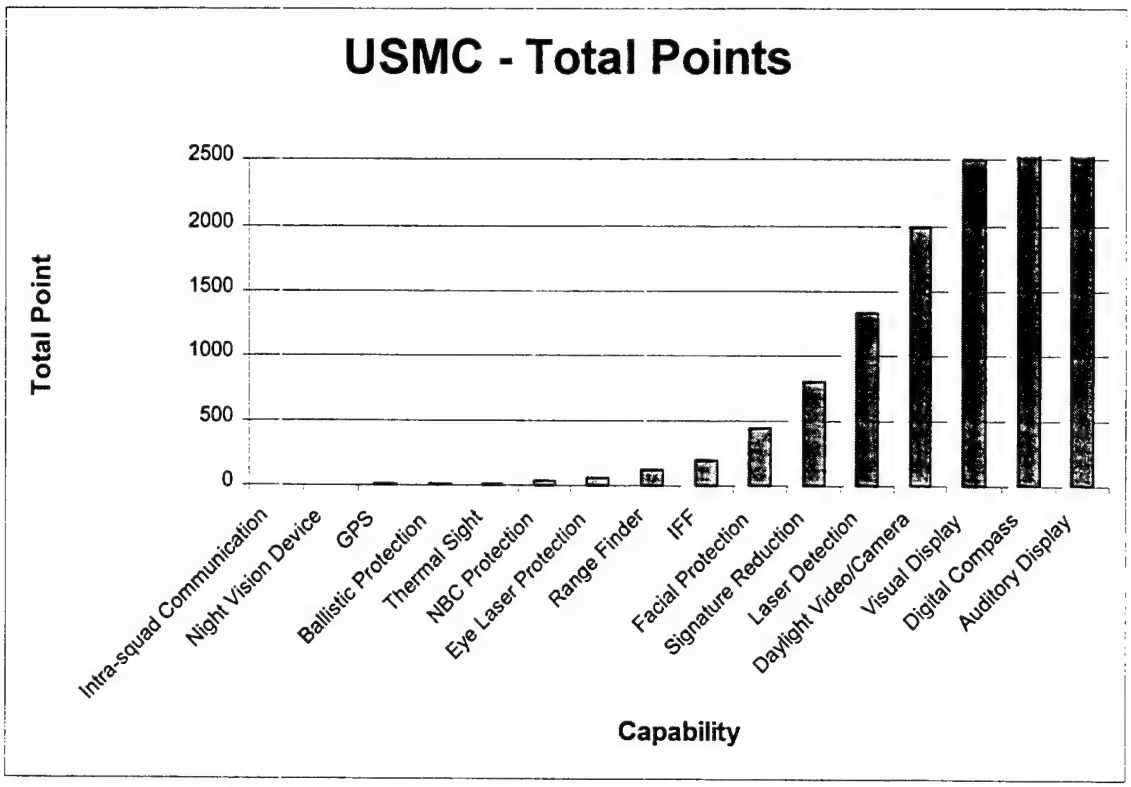

Figure 3-A. Total Points for USMC Respondents.

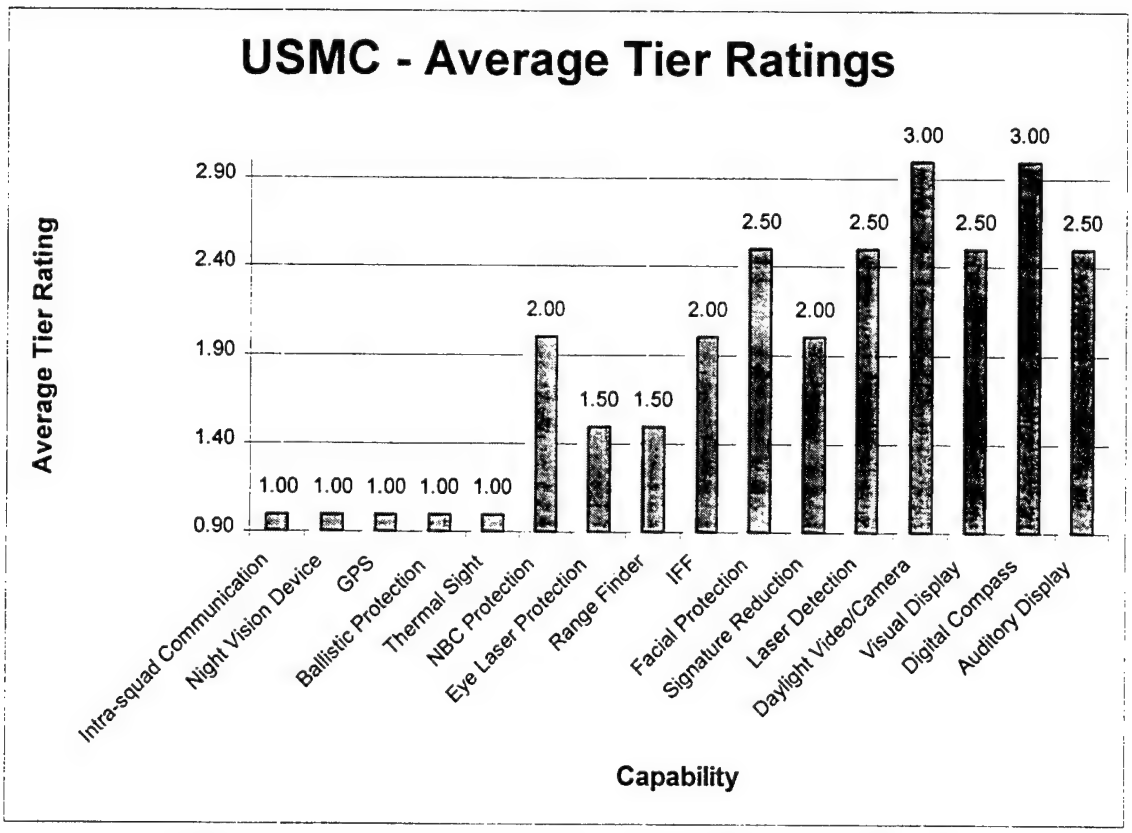

Figure 3-B. Average Tier Ratings for USMC Respondents.

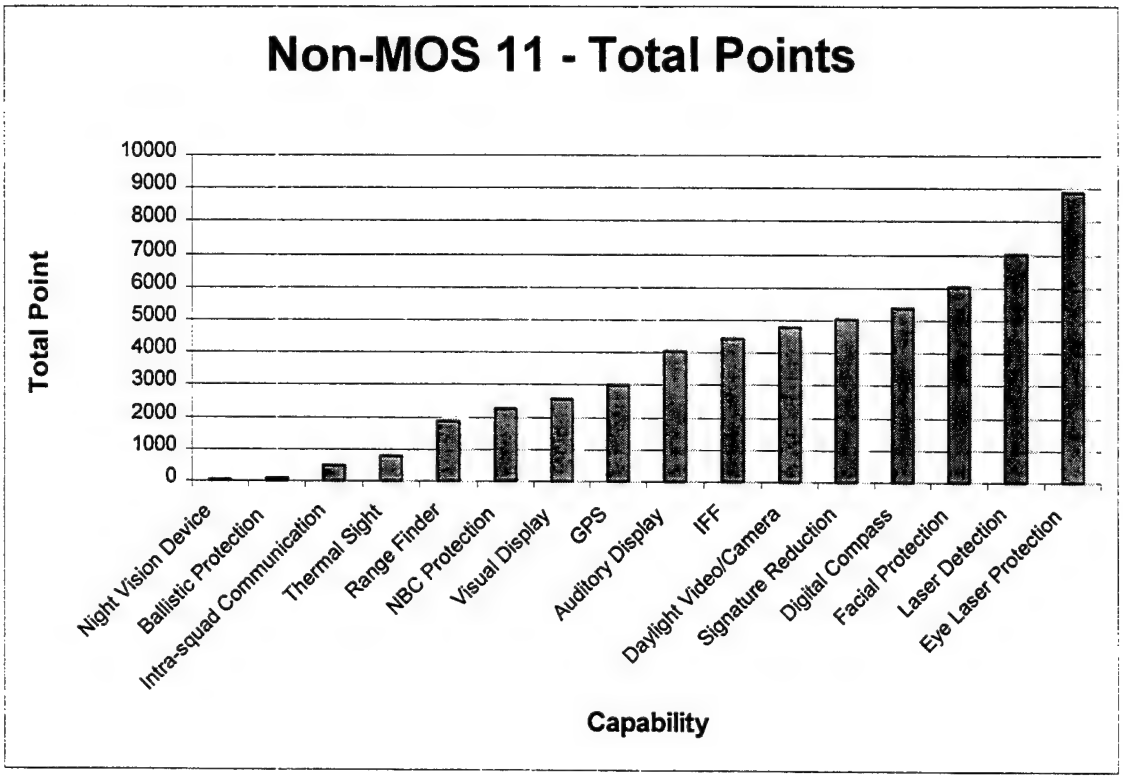

Figure 4-A. Total Points for non-MOS 11 Respondents.

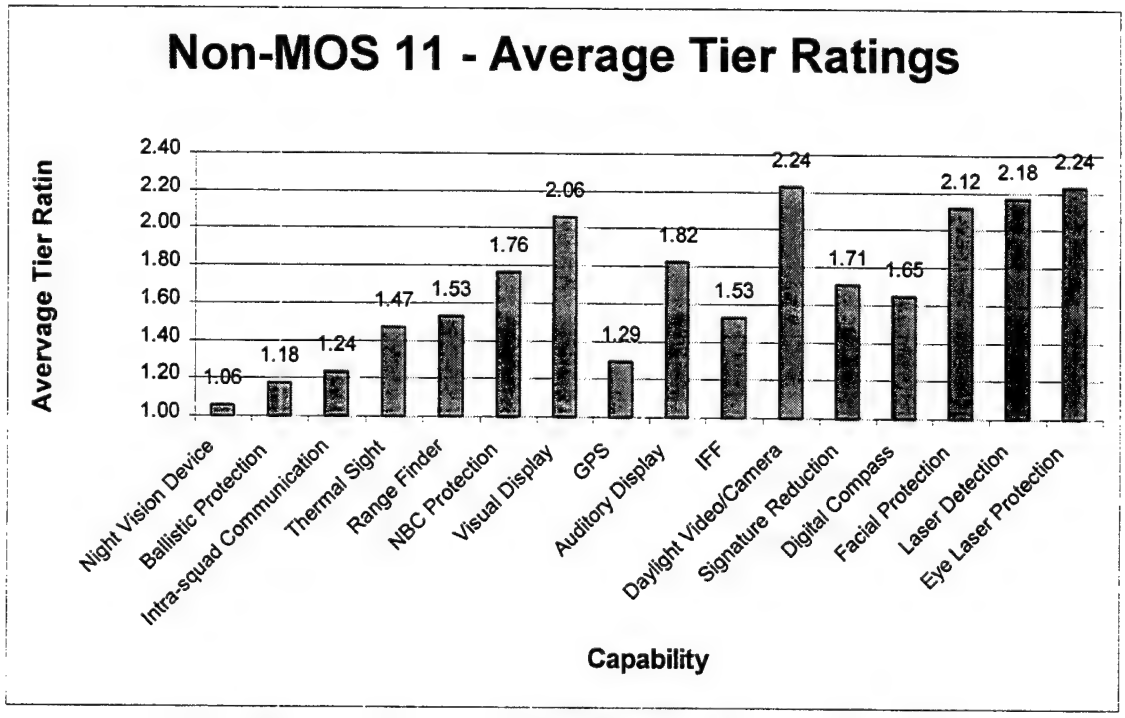

Figure 4-B. Average Tier Ratings for non-MOS 11 Respondents.

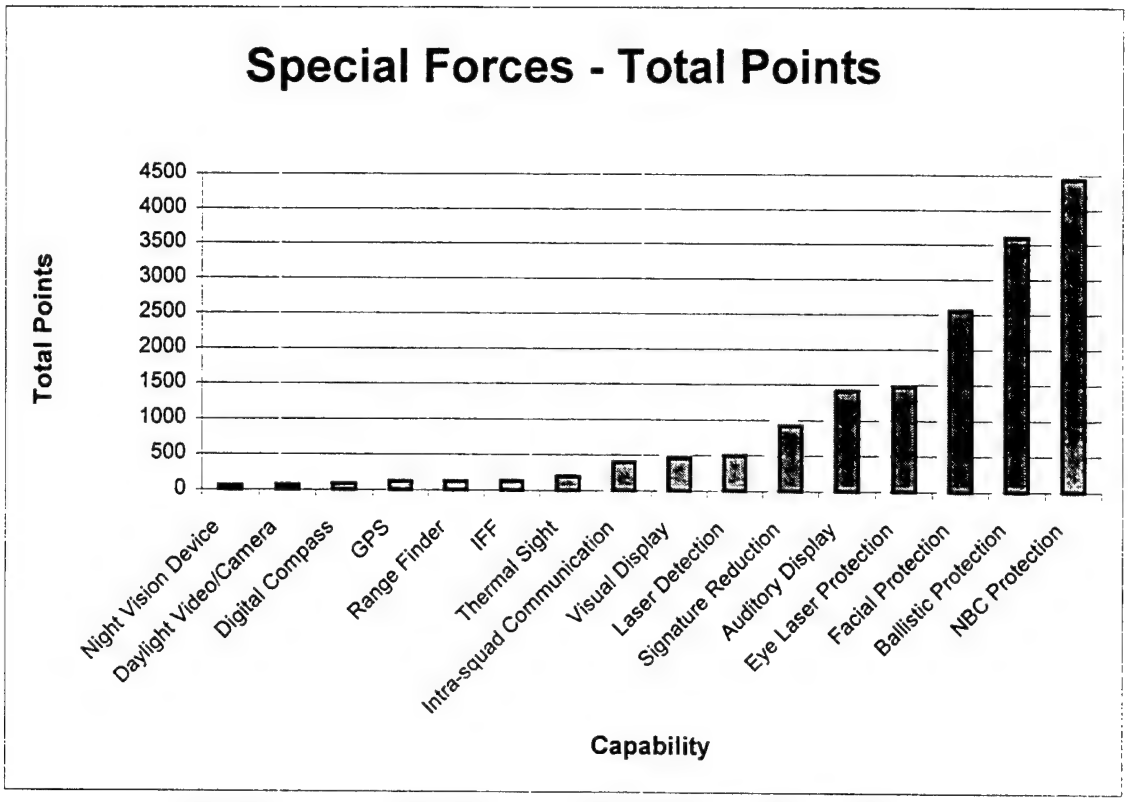

Figure 5-A. Total Points for Special Forces Respondents.

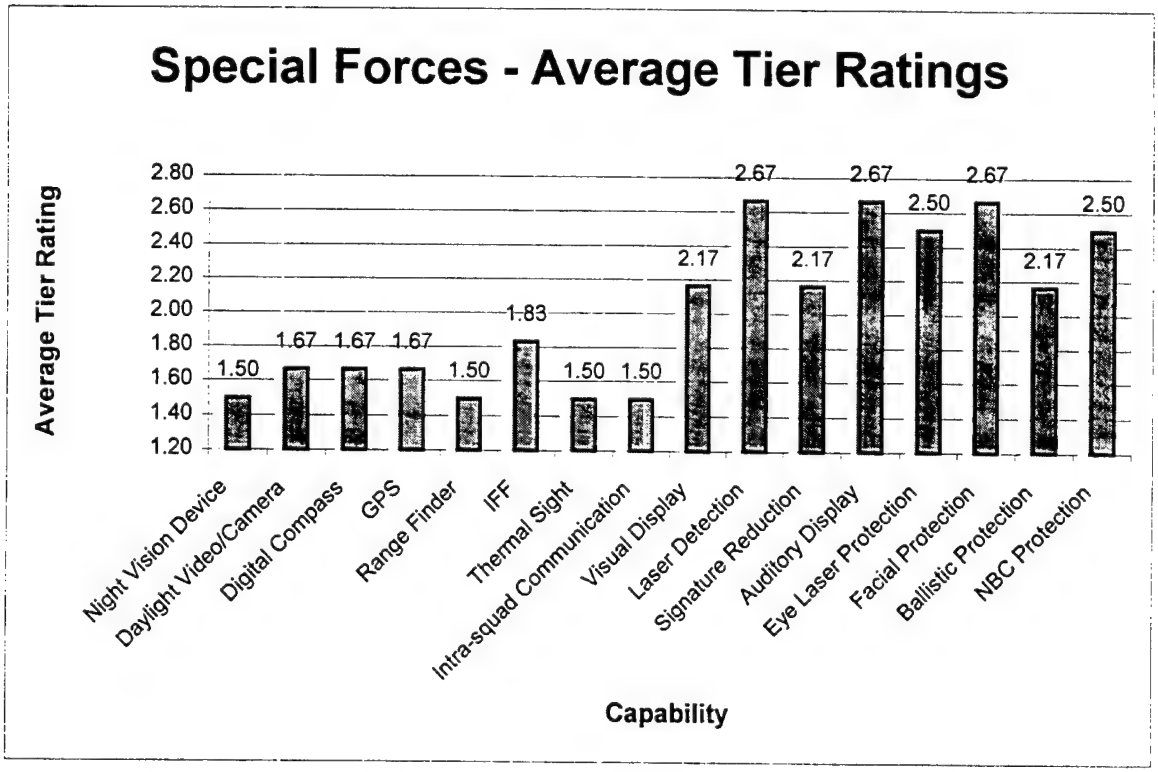

Figure 5-B. Average Tier Ratings for Special Forces Respondents.

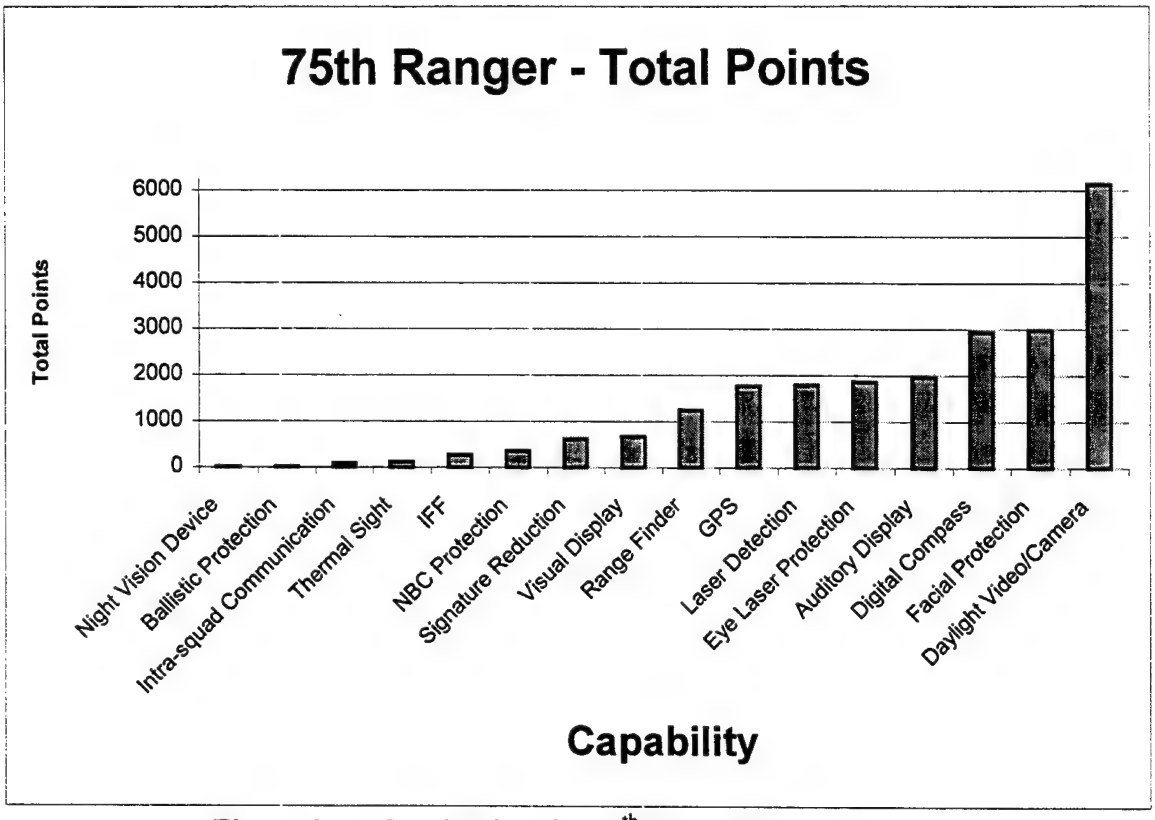

Figure 6-A. Total Points for 75th Ranger Respondents.

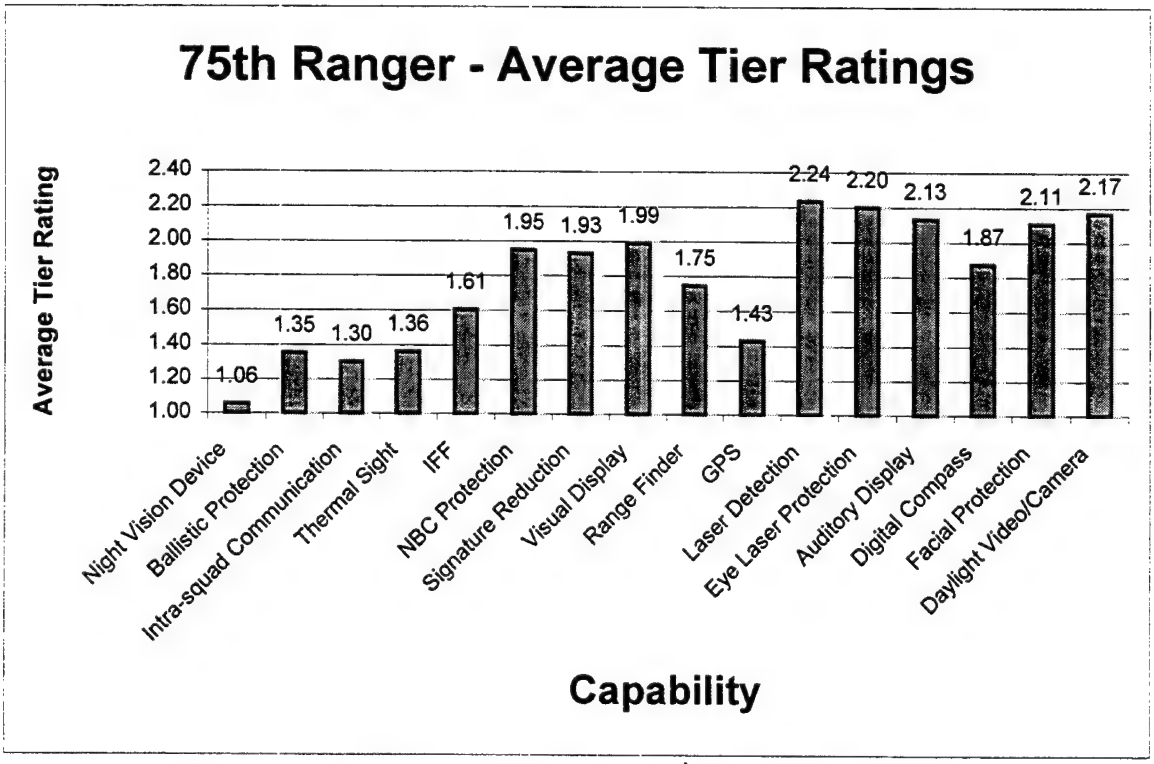

Figure 6-B. Average Tier Ratings for 75th Ranger Respondents.

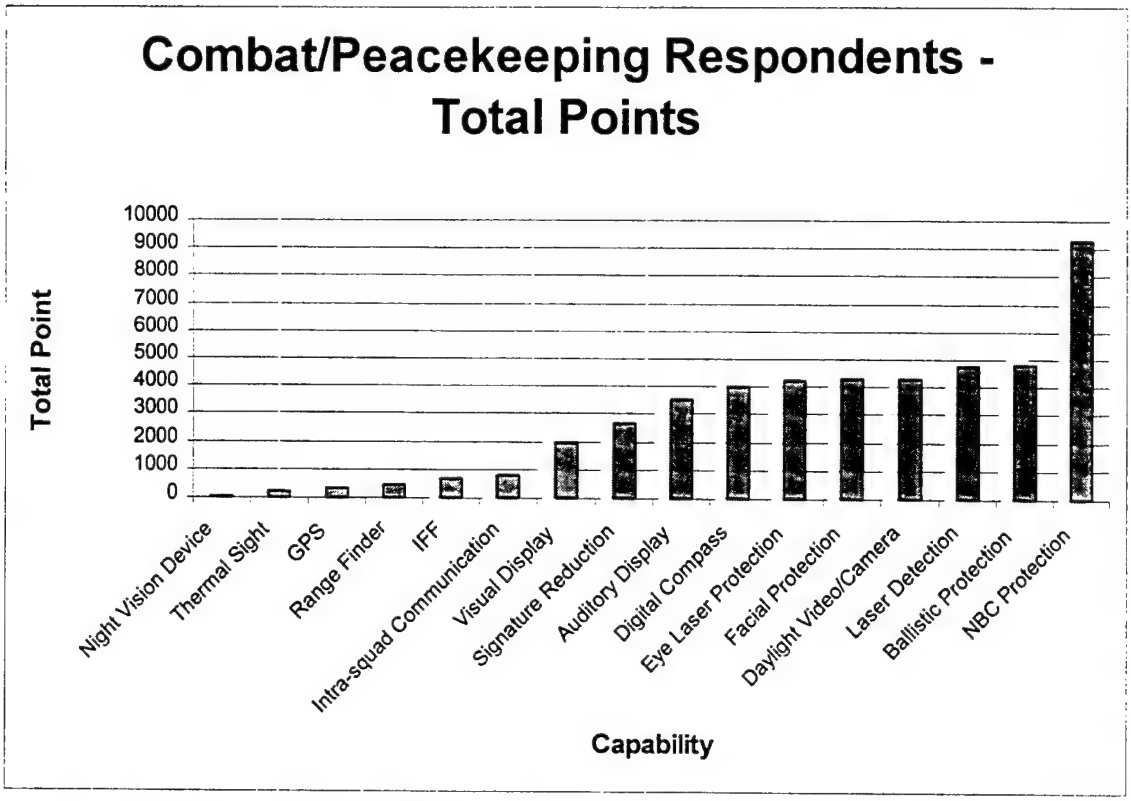

Figure 7-A. Total Points For Combat/Peacekeeping Respondents.

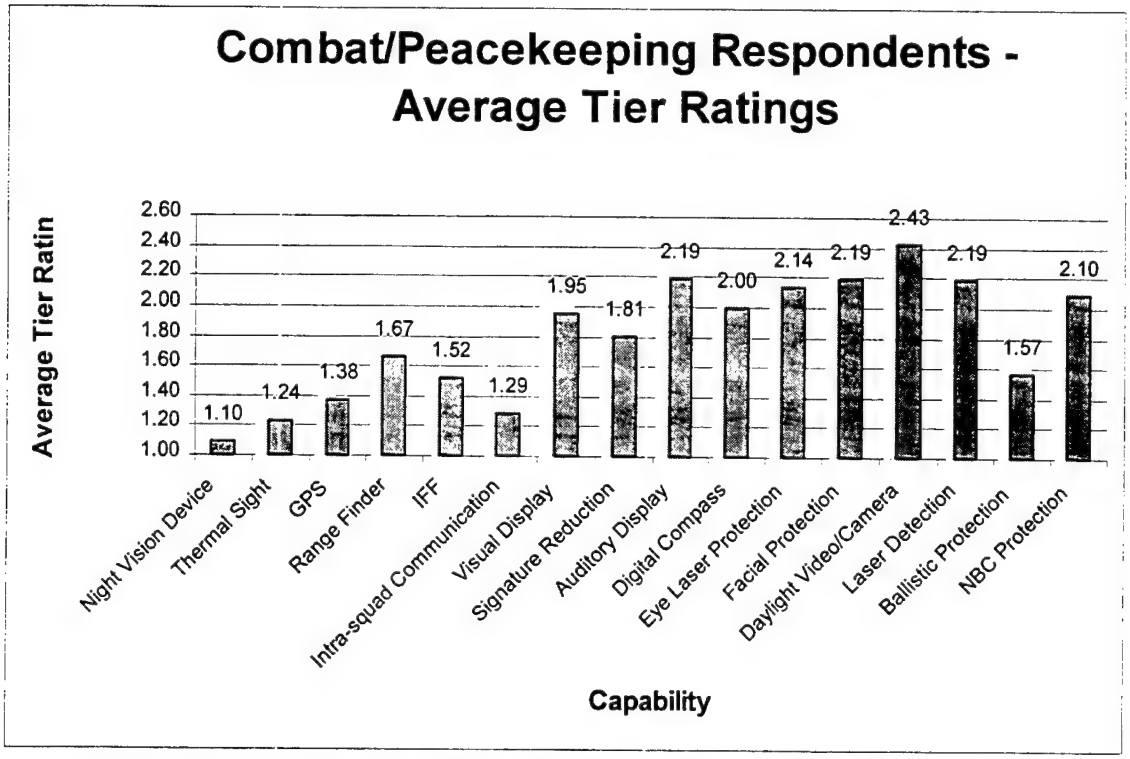

Figure 7-B. Average Tier Ratings for Combat/Peacekeeping Respondents.

Tables 3 and 4 show the capability prioritization and total points for the primary and secondary groups, respectively. As defined earlier, the groups in Table 3 are of primary importance because they represent individuals that are dismounted infantry or combat support individuals. The results for the all IOAC group were originally expected to be the definitive prioritization order. However, complete confidence could not be placed in this prioritization order, because: 1) the MOS 11 group made up 75% of the all IOAC group, and 2) the subset groups scored some capabilities significantly different. One example of this was the 75th Ranger group that scored the GPS capability much lower than the other groups. A possible explanation for this difference was that Rangers typically have operations of either short duration, in small areas, and/or in locations precluding the use of GPS, where they rely on other methods of location determination.

A statistical analysis conducted to investigate the correlation between groups found that the prioritized capabilities for the Special Forces respondents did not correlate significantly with any of the other groups. The highest correlation was with the non-MOS 11 group. This was further investigated to determine an explanation. It was concluded Special Forces primarily function in advisory roles and do not operate with helmets unless a deployment involves airborne operations. The more highly scored Special Forces capabilities appear to coincide with this explanation.

It must be pointed out again that the Helmet Integrated Technology Team's original focus was on both Marine Corps and Army dismounted infantry. The all IOAC group could not confidently be used, because of the large difference in the number of respondents for the MOS 11 and USMC groups. There were just too many MOS 11s for the USMC group's input to be considered equally. Methods of interpreting and/or correcting the data to generate a more reliable prioritization order were discussed. The method decided upon was to average the priority orders for the MOS 11 and USMC groups together. Although to do this, it had to be assumed that the results for the USMC, while consisting of only 2 respondents, did represent the USMC in general. It is recommended that this survey be taken by more USMC officers to confirm this assumption.

In addition to the MOS 11 and USMC groups, some input from the non-MOS 11s was desired, because this group would also be using the future headborne system. It was expected that the non-MOS 11 prioritization order would be slightly different from the MOS 11 and USMC orders, because the non-MOS 11s would score better certain capabilities that increased their operational effectiveness or facilitated their jobs.

In averaging the prioritization orders, a weight was given to each group. This was because the non-MOS 11 group was not considered as important as the MOS 11 and USMC groups. It was considered not as representative of true dismounted infantryman desires as the other two groups, but some influence on the average was still desired. Since the USMC and MOS 11s groups were the principal prioritization orders for consideration, they were weighted equally at 0.45. The non-MOS 11 made up the last 0.1. On the left side of table 5, the priority order for each capability by group is shown, and on the right, the prioritization order obtained using the weighted average is presented.

Table 3. Capability Prioritization Based On Total Points For Primary Groups

Rank	All IOAC	Points	MOS 11	Points	USMC	Points	no-MOS 11	Points
1	Night Vision Device	432	Night Vision Device	211	Intra-squad Communication	2	Night Vision Device	52
2	Intra-squad Communication	4140	Intra-squad Communication	3195	Night Vision Device	6	Ballistic Protection	111
3	Thermal Sight	5219	Ballistic Protection	3676	GPS	7	Intra-squad Communication	513
4	Ballistic Protection	10307	Thermal Sight	4051	Ballistic Protection	10	Thermal Sight	801
5	GPS	11229	GPS	7226	Thermal Sight	11	Range Finder	1878
6	Range Finder	15705	Range Finder	12159	NBC Protection	40	NBC Protection	2274
7	IFF	18573	IFF	12529	Eye Laser Protection	67	Visual Display	2559
8	Digital Compass	26571	Digital Compass	14374	Range Finder	123	GPS	3002
9	NBC Protection	33054	NBC Protection	21295	IFF	200	Auditory Display	4069
10	Visual Display	34176	Visual Display	21350	Facial Protection	440	IFF	4435
11	Daylight Video/ Camera	36061	Daylight Video/Camera	23517	Signature Reduction	803	Daylight Video/Camera	4820
12	Signature Reduction	36630	Auditory Display	24174	Laser Detection	1340	Signature Reduction	5074
13	Auditory Display	37133	Signature Reduction	26550	Daylight Video/Camera	2000	Digital Compass	5419
14	Facial Protection	44965	Facial Protection	31124	Visual Display	2500	Facial Protection	6018
15	Laser Detection	48127	Eye Laser Protection	33650	Digital Compass	2800	Laser Detection	7050
16	Eye Laser Protection	50643	Laser Detection	33817	Auditory Display	2880	Eye Laser Protection	8915
Respondents		118		88		2		19

Table 4. Capability Prioritization Based On Total Points For Secondary Groups

Rank	75th Ranger	Points	Special Forces	Points	Combat/ Peacekeeping	Points
1	Night Vision Device	12	Night Vision Device	61	Night Vision Device	80
2	Ballistic Protection	16	Daylight Video/Camera	68	Thermal Sight	224
3	Intra-squad Communication	91	Digital Compass	87	GPS	370
4	Thermal Sight	124	GPS	124	Range Finder	494
5	IFF	272	Range Finder	124	IFF	719
6	NBC Protection	354	IFF	128	Intra-squad Communication	831
7	Signature Reduction	619	Thermal Sight	202	Visual Display	1961
8	Visual Display	680	Intra-squad Communication	404	Signature Reduction	2648
9	Range Finder	1244	Visual Display	463	Auditory Display	3528
10	GPS	1777	Laser Detection	500	Digital Compass	4034
11	Laser Detection	1796	Signature Reduction	925	Eye Laser Protection	4230
12	Eye Laser Protection	1868	Auditory Display	1420	Facial Protection	4276
13	Auditory Display	1981	Eye Laser Protection	1480	Daylight Video/Camera	4305
14	Digital Compass	2944	Facial Protection	2560	Laser Detection	4788
15	Facial Protection	2991	Ballistic Protection	3601	Ballistic Protection	4846
16	Daylight Video/Camera	6140	NBC Protection	4440	NBC Protection	9323
	Respondents	8		6		21

Table 5. Weighted Groups Prioritization List

Capability	MOS 11 Rank	USMC Rank	non-MOS 11 Rank	Weighted Score
Auditory Display	12	16	9	13.5
Ballistic Protection	3	4	2	3.35
Daylight Video/Camera	11	13	11	11.9
Digital Compass	8	15	13	11.65
Eye Laser Protection	15	7	16	11.5
Facial Protection	14	10	15	12.2
GPS	5	3	6	4.4
IFF	7	9	8	8.2
Intra-squad Communication	2	1	3	1.65
Laser Detection	16	12	14	14.1
NBC Protection	9	6	13	7.35
Night Vision Device	1	2	1	1.45
Range Finder	6	8	4	6.8
Signature Reduction	13	11	12	12
Thermal Sight	4	5	2	4.45
Visual Display	10	14	5	11.5
Weight	0.45	0.45	0.1	

Capability By Weighted Score	Weighted Score
Night Vision Device	1.45
Intra-squad Communication	1.65
Ballistic Protection	3.35
GPS	4.4
Thermal Sight	4.45
Range Finder	6.8
NBC Protection	7.35
IFF	8.2
Visual Display	11.5
Eye Laser Protection	11.5
Digital Compass	11.65
Daylight Video/Camera	11.9
Signature Reduction	12
Facial Protection	12.2
Auditory Display	13.5
Laser Detection	14.1

The results of the averaged prioritization order were iterative figures, based on the arbitrary scores with some overlapping confidence intervals generated by the support tool created for this project. Because of these facts, it was decided that this order should be converted in a way more useful to decision-makers.

The purpose of the capability prioritization list was not to force decision-makers to focus on specifically providing each capability as it was listed from the top down. One reason for this was the list was only to serve as a support tool for a tradeoff analysis. Another reason was the overlap of confidence intervals between some capabilities, thus not permitting a definitive prioritization order. By grouping capabilities with similar scores, decision-makers would be allowed more latitude in investment and design decisions.

Most capabilities fell into ranges of weighted scores, where the capabilities were interchangeable in prioritization order due to some of the reasons given earlier. These ranges were called "Levels". The "Levels" went from I to III and consisted of capabilities with the following weighted scores:

- Level I - weighted score between 1.45 - 4.45,
- Level II - weighted score between 6.8 – 8.2,
- Level III - weighted score between 11.5 – 14.1.

By using these "Levels" as guides, their meaning and significance could be stressed to decision-makers. Level I represented capabilities the user preferred the most, because they significantly increased operational effectiveness or provided desired protection. Level II were the capabilities the user had some preference for, but not as strongly as Level I capabilities. Level III were the capabilities that user preferred the least. In summary, the user preferred to have capabilities in Level I before Level II or III, and then Level II before Level III.

The prioritized list seems to be based around two considerations by the user: protection and increased operational effectiveness. The protection capabilities consisted of Ballistic, Facial, Eye Laser and NBC Protection. Besides having or not having these, they could also be provided at different levels of protection. This was especially true of Ballistic and NBC Protection, where decisions about the level of protection required was stated in the TRADOC Operational Requirements Document (ORD). These requirements were obtained from the US Army Infantry Center at Fort Benning. Further analysis needs to be conducted focused on these protection areas for a complete and accurate tradeoff analysis to be considered.

The second basis of consideration was increased operational effectiveness. Potentially all of the capabilities would increase operational effectiveness, but preference was given to those that fulfilled specific needs. These needs correlated with the desires generated by the Future Warrior Architecture - Infantry operational capability analysis. These needs/desires were:

1) Awareness of Where Friendly Forces Are;
2) Awareness of Where Opposing Forces Are;
3) Identify Friend or Foe; and
4) First Round Kill.

The capabilities in each Level will be discussed, starting with Level I. The possible reason(s) why a capability scored in a specific Level will be conjectured. After this, some of the capabilities, which scored at the extremes of their Level, will be further grouped into sub-Levels.

Two Level I capabilities, Night Vision Device and Thermal Sight, were well suited to satisfying desires #1 and #2 from the capability analysis. These two capabilities significantly aid in the detection and awareness of enemy or friendly forces. Another Level I capability, GPS, would provide more accurate location information especially when related to using maps and sensor detection equipment, thus contributing to the awareness of other forces. Ballistic Protection was also considered a top priority. It cannot be determined if this is due to the fact infantrymen associate helmets with ballistic protection, and thus think they are one and the same, or maybe they just feel more at ease wearing a helmet. The last Level I capability was Intra-squad Communication. There could be several reasons for this ranging from facilitating command, speeding up the dissemination of information, and/or increasing unit and support coordination. Intra-squad Communication being in Level I is supported by data previously collected from foreign studies, which found the operational effectiveness of any individual capability was enhanced by synergy with the Intra-squad Communications capability.

In Level II were the capabilities Range Finder, IFF and NBC Protection. The most reasonable explanation as to why the Range Finder and IFF scored in Level II was the capabilities in Level I would be used first to determine if an individual or unit was in the area, then the Range Finder and IFF could be used for more specific information on the target. The Range Finder gives the distance to the target and IFF provides information if this individual or unit is friendly or enemy. As stated earlier, NBC Protection is a protection capability. It probably ended up in this level because the respondents did not consider NBC a significant threat or the likelihood of facing it being low. In actuality, the National Ground Intelligence Center (NGIC) defines the NBC threat, then the material developers and user quantify the hazard, and the user defines the NBC protection requirement.

The following capabilities were in Level III: Visual Display, Eye Laser Protection, Digital Compass, Daylight Video/Camera, Signature Reduction, Facial Protection, Auditory Display, and Laser Detection. Again, these capabilities fall into two categories: protection or increased operational effectiveness. Eye Laser and Facial Protection scored in this level probably due to being a low threat or not of significant need. The other capabilities all contribute to increased operational effectiveness. However, they do not specifically address top user needs, as defined by the FWA - I operational capability analysis.

In addition, some of the capabilities existing in both Level I and III had at least a 1.3 difference between weighted scores from the rest of the level. These groups of capabilities were divided into sub-levels. These sub-levels were of note, because they represented extremes within their levels. Sub-level 1A consisted of the capabilities scored 1.45 and 1.65 (Night Vision Device and Intra-squad Communication), with the other capabilities in Level I, sub-level 1B scored from 3.35 to 4.45. As stated before, Level I were those capabilities the user considered important to have. This sub-level represented those capabilities that the user preferred the most among the Level I capabilities. Level III also had a similar sub-level, Level 3B, made up of the two lowest scoring capabilities, 13.5 and 14.1 (Auditory Display and Laser Detection). These were considered the least important of the capabilities, interpreted to mean the user only wanted these after all other capabilities were provided.

The Final Capability Prioritization List is presented in Table 6.

Conclusions

Table 6. Final Capability Prioritization List

Level	Capability	Sub-Level	Preference
1	Night Vision Device Intra-squad Communications	A	Very Strong
	Ballistic Protection Thermal Sight Global Positioning System (GPS)	B	Strong
2	Identification, Friend or Foe (IFF) Range Finder NBC Protection		Average
3	Digital Compass Visual Display Eye Laser Protection Daylight/Video Camera Signature Reduction Facial Protection	A	Some
	Auditory Display Laser Detection	B	Low

In Table 6, Level I represented capabilities the user preferred the most, because they significantly increased operational effectiveness or provided desired protection. Level II were the capabilities the user had some preference for, but not as strongly as Level I capabilities. Level III were the capabilities that user preferred the least. In summary, the user preferred to have capabilities in Level I before Level II or III, and then Level II before Level III.

Level I and III are also divided into sub-Levels, which represent more defined ranges within these Levels. Sub-Level IA are the capabilities preferred the most among Level I capabilities, and sub-Level IIIB are the capabilities preferred the least among Level III capabilities.

The results of this prioritization effort appear to be very reasonable and are supported by a recent After Action Report from Land Warrior European Demonstrations (EUROSTORY 2000 (Paris, 13-23 June) and NATO SOLDIER 2000 (Netherlands, 24-30 June)). The consensus of user feedback considered some of the same capabilities essential. The feedback was:

> The key capabilities that every soldier needs are: map display showing own location and location of other squad members and other squads of the platoon; voice commo; and indirect shooting using DVS (Driver Visual System) and/or thermal image in HMD.

It has to be understood that these users were using the 0.6 Version of the Land Warrior System, which incorporated some of the capabilities surveyed, while the respondents in this effort's survey had to conceptualize potential capabilities on a headborne platform. The map display showing own location and location of other squad members requires the unstated capability of determining your positioning, which is what GPS does. The map display, which will be equated with the Visual Display capability, probably scored low on the survey, because the respondents were more concerned with having location information than displaying the information.

The prioritized capabilities do appear to address the top user needs as defined in the survey conducted by the Future Warrior Architecture - Infantry. All the Level I and II capabilities, except Ballistic Protection, fulfill the need of knowing the location of enemy and friendly forces.

It has to be remembered that the prioritization survey results are to be a tool used by decision-makers in the tradeoff analysis, and are intended to be only one piece of information available for this purpose.

Recommendations

1. Conduct further analysis to determine if the assumption that the prioritization results from the two Marine respondents represents actual USMC prioritization. If the assumption is correct, then the results in Table 6 are justified. If the assumption is incorrect, then the results could be recalculated using the correct prioritization. The new results could either fall into the same Levels already defined or produce a new final capability prioritization list.

2. Conduct further analysis on the levels of protection possible, in particular ballistic and NBC. It was not known what specifically is desired for protection: maintaining the status quo, increasing the amount of protection, or decreasing the weight of protection. These issues need to be more accurately defined to be useful in the tradeoff analysis. One of the objectives of the Future Warrior System is reducing weight, but this is too broad a definition for a thorough tradeoff analysis. Simply reducing the weight involves no tradeoff. It has to be remembered that adding capabilities to a headborne system will increase the weight. Numbers, from what exists and is possible, will be needed to do an accurate tradeoff. For example, the weight can be reduced by 8 grams while maintaining the current level of fragment protection, or the weight can be increased 2 grams and perhaps offer 9mm bullet protection.

3. It is recommended that the next step in the development of the future integrated headborne system be started. The prioritized list produced in this step was specific enough to be used at this time as an aid in the tradeoff analysis that is the next step. Although it has been also recommended that more analysis be conducted to validate the results obtained from the USMC, we believe even if a future analysis produces a changed priority list for the USMC, the capabilities will still fall into the same Levels as currently exist. This impression was produced by conversations with several Marines on USMC headborne priorities. These conversations occurred before the survey was conducted, so their opinions were made independent of the survey results. Because we believe any possible modifications that could result from more USMC analysis would not significantly alter the prioritized list, commencing the trade off analysis with the current prioritized list would provide the basis for a good start.

This document reports research undertaken at the U.S. Army Soldier and Biological Chemical Command, Soldier Systems Center, and has been assigned No. NATICK/TR-01/006 in a series of reports approved for publication.

APPENDIXES

APPENDIX A

PRIORITIZATION SURVEY

PRIORITIZATION SURVEY

The purpose of this survey is to prioritize capabilities, which are to be integrated into a future integrated headborne system proposed for the 2010-2015 timeframe. This future headborne system is to be part of a system that will be the successor to the Land Warrior System. Feedback has already been obtained on the importance of other issues, such as cost, weight, comfort, etc., in the development of this future system. For purposes of this survey, we are primarily concerned with new capabilities that could be integrated into a headborne system. This future headborne system will be designed specifically for the dismounted infantryman. The goal of this headborne system is to permit the user hands-free operation while having improved capabilities. The feedback from this survey will provide data on what capabilities are most desired or needed by the dismounted infantryman. Please complete this survey ranking the impact of a capability if each dismounted infantryman has that capability. Also, provide comments if you have any suggestions for additional headborne capabilities not on the list.

There are 15 capabilities listed. First rate the capabilities into the following tiers: A - this capability will have a significant impact on performance; B - the capability will have some impact on performance; and C - the capability will have a slight impact on performance. You can put as many to none of the capabilities in a tier, e.g., 5 capabilities could be in tier A and the remaining 10 in tier B. Then rank capabilities in each tier. Remember that the lowest rated capability in a higher tier must be more important than the highest rated capability in a lower tier. If two capabilities in the same tier are of equal importance rate them the same and then skip a number, if laser detection and range finder are both in tier B and rated #3, then the next highest capability in tier B would be rated #5.

Name: Rank: MOS:

Years experience in the Army:
Years experience on active/guard/reserve duty:

List your last three assignments. Location, months/years in each assignment.

	Assignment/Position	**Location**	**Months/Years**
1.			
2.			
3.			

Do you have combat experience?

If yes, list your combat experience and position (i.e. company commander, platoon leader, etc), including location and number of months/years.

Experience/Position	**Location**	**Months/Years**

Capability	Definition	Tier	Ranking in Tier
Auditory Display	Auditory displays are for the presentation of radio voice and other information such as auditory warnings for laser detector actuation and other events requiring alerts or warnings, such as a significant change in the status of a system component (e.g., low battery warning).		
Ballistic Protection	Ballistic Protection is the protection to the head from fragments and small arms fire.		
Digital Compass	Digital Compass provides a reading on the azimuth the user is facing.		
Daylight Video/Camera	Daylight Video/Camera takes pictures or film which can be transmitted wirelessly to others (i.e., platoon leader, TOC)		
Eye Laser Protection	Eye Laser Protection provides eye protection from laser weapons and aiming devices hitting eyes.		
Facial Protection	Facial Protection is the protection to the face from fragments and small arms fire not provided by ballistic protection to the head.		
GPS	GPS is an integrated component of the headborne system that would provide location information.		
IFF	IFF permits the ability to identify friend or foe between dismounted combatants.		
Intra-squad Communication	Intra-squad Communication provides each individual soldier the ability to communicate with fellow squad members and superiors. As the rank of the soldier increases, communications with lower units will be reduced or eliminated and higher units will be expanded or added.		
NBC Protection	NBC Protection will provide this type of protection without interfering with other capabilities.		
Night Vision Device	Night Vision Device provides the soldier with the capability to operate at night.		
Laser Detection	Laser Detection will provide the user a warning that he has been lased (targeted by a laser).		
Range Finder	Range Finder provides the user with the range to a target.		
Signature Reduction	Signature Reduction reduce or eliminate detection by non-visual sensors (thermal, night vision, etc.)		
Thermal Sight	Thermal Sight allows the user to detect targets using by heat differences.		
Visual Display	Visual Display provides a display of the information from various sensors for the user (i.e., see-through goggles, one-eye monocle, or visor).		

APPENDIX B

RESPONDENT BACKGROUNDS

Table B-1. Background Information on Each Respondent

Res #	Rank	MOS	Component	Years of Duty	If Guard?	Years of Duty	Latest Location	Earliest Location	Unit of Note	Co Cdr?	Co XO?	Staff	Spt Pln Ldr	Mortar /AT/ AA /Tank Pln Ldr	Rifle Ptn Ldr	Enlistd	Combat?
1	CPT	11A	Active				Ft Campbell	Ft Campbell			6		13		11		
2	CPT	15A	Active	4.5			Ft Campbell	Korea					18		16		
3	CPT	11A	Active	7			Ft Riley	Ft Riley			2	13		M-8			ODS
4	CPT	11A	Active	7			Korea	Ft Campbell				12			30		
5	CPT	18A	Guard				Alabama			12							
6	CPT	11A	Active		x	2.7	Ft Benning	Ft Benning			18	6				2.7	sqd ldr in ODS
7	CPT	11A	Active				Hawaii	Hawaii			7	19			10		
8	CPT	11A	Active	4			Alaska	Alaska			10		12		12		
9	CPT	12A	Active				Ft Benning	Ft Benning				14	18	T-10			Heli drgunner SWA
10	CPT	302	USMC	13			29 Palms	29 Palms									
11	CPT	35D	Active	5			Korea	Ft Gordan				12					
12	CPT	12A	Active	4	x	4	Ft Hood	Puerto Rico							84	4	
13	CPT	11A/92A	Active	4			Ft Campbell	Ft Campbell					8	AT-9	13		
14	CPT	11A	Active	4			Germany				17				18		
15	CPT	11A/MI	Active	4			Korea	Ft Lewis				23			17		
16	CPT	11A5S5W	Active	9	x	7	Germany	Ft Bragg	75th	12		9		M-9		7	
17	CPT	11A5S5W	Active	4			Ft Bragg	Ft Bragg			18	3			11		
18	1LT	Armor	Active	2	x	6	Texas	Texas				12		T-10			
19							Ft Bragg	Ft Bragg			22				16		
20	CPT		Active	4	x	2	Ft Irwin	Ft Irwin			14	5		T-12		11	
21	CPT	11A	Active	4	x	5	Ft Benning	Hawaii								5	oman
22	CPT	11A	Active	4			Ft Campbell	Ft Campbell			13	9		AT-4			
23	CPT	11A	Active				Ft Drum	Ft Lewis	SF						36	4	tm ldr in ODS
24	CPT	11A	Active	4			Germany	Germany			14	1			20		PL in Bosnia
25	CPT	18Z	Active	12	x	8	Ft Bragg		SF		36	12				8	ODS/Kosovo
26	1LT	65D/18D	Active	10	x	7			SF							7	medic in ODS
27	CPT	11A	Active	4					75th			7	12		12		
28	CPT	21A Eng	Active				Ft Lewis	Ft Lewis			18	8	12				
29	CPT	Trans Corp	Active	5								12					

Table B-1. Background Information on Each Respondent (Continued)

Res #	Rank	MOS	Component	Years of Duty	If Guard?	Years of Duty	Latest Location	Earliest Location	Unit of Note	Co Cdr?	Co XO?	Staff	Spt Pln Ldr	Mortar /AT/ AA /Tank Pln Ldr	Rifle Ptn Ldr	Enlistd	Combat?
30	CPT	11A	Active	4			Germany	Germany			10	6			14		
31	CPT	11A	Active				Ft Hood	Ft Hood						T-24/M-12			Kosovo
32	1LT	11A	Active	16			Ft Benning	Ft Benning							15	yes	ODS
33	CPT	11A	Active	6			Ft Lewis	Hawaii	75th		12			M-12	12	yes	
34	CPT	11A	Active		x	5	Ft Benning	Texas				13		M-12	22	yes	
35	CPT	11A	Active	6			Ft Hood	Germany				24			12	yes	
36	CPT	11A					Ft Hood	Ft Hood			7	8		M-7			
37	CPT	11A	Active				Ft Bragg	Ft Bragg			16	4			14		
38	CPT	11A															
39	CPT	11A	Active	4	x	3	Ft Bragg	Ft Bragg				6	8	AT-6		yes	
40	CPT						Ft Riley	Ft Riley							22		
41	CPT	11A	Active	10	x	1	Ft Drum	Texas			14		11		13	yes	rifleman in ODS
42	CPT	11A	Active	4			Korea	Ft Lewis			21				13		
43	CPT	11A	Active	4			Ft Benning	Ft Campbell	75th		20				9		
44	CPT	11A					Ft Riley	Ft Riley			11			M-2	16		
45	CPT	92A			x	17	Chicago	Chicago				6					
46	CPT	25A	Active	4	x		Ft Campbell	Korea		24	12					yes	
47	CPT	11A	Active	2	x	3	Ft Lewis	Washington			8				37		
48	CPT	11A	Active	3			Alaska	Ft Benning				12		AT-12	12		
49	CPT	11A	Active	6	x	8	Ft Bragg	Michigan			10			AT-14	9	yes	
50	CPT	11A	Active	6			Ft Hood	Bosnia				6	4				Bosnia
51							Ft Drum	Ft Drum			14			M-5	13		
52	CPT	11A	Active	6	x	4	Ft Lewis	Korea	75th					M-6	32	yes	Fire Det Spc ODS
53	CPT	11A	Active	4			Ft Bragg	Ft Bragg			6		18		11		
54	CPT	11A	Active	4			Hawaii	Hawaii				14			21		
55	CPT	11A	Active	4			Ft Riley	Ft Riley			9	12		T-6			
56	CPT	11A										11		M-11	11		
57	1LT	14A					Ft Hood	Ft Hood			5			AA-24			
58	CPT	11A	Active	4	x	3	Ft Stewart	Korea			18	4			12	yes	

Table B-1. Background Information on Each Respondent (Continued)

Res #	Rank	MOS	Component	Years of Duty	If Guard?	Years of Duty	Latest Location	Earliest Location	Unit of Note	Co Cdr?	Co XO?	Staff	Spt Pln Ldr	Mortar /AT/ AA /Tank Pln Ldr	Rifle Ptn Ldr	Enlistd	Combat?
59	1LT	11A	Active	3.5	x	4	Ft Drum	Ft Drum								yes	
60	CPT	O302	USMC	8			California										Somalia
61	CPT	11A	Active	4.5			Ft Campbell	Ft Campbell			3				19		
62	CPT	11A	Active	4			Ft Campbell	Ft Campbell				24		M-7	12		
63	CPT	11A	Active	4			Ft Bragg	Ft Campbell	75th								
64	CPT	11A	Active	4	x	4	Hawaii	Korea			12			T-12	18	yes	
65	CPT	11A	Active	4			Ft Bragg					6			30		
66	CPT	11A	Active	14			Alaska	Germany	SF		6				12	yes	
67	CPT	11A	Active	4			Ft Campbell	Ft Campbell			12			AT-12	12		
68	CPT	11A	Active	6			Germany	Germany							18		
69	CPT	11A	Active	4			Ft Campbell	Ft Campbell									
70	CPT	11A	Active	4			Ft Bragg	Ft Bragg			16			AT-14	8		
71	CPT	13A					Ft Bragg	Ft Bragg				18		M-16			
72	CPT	13A	Active	4			Ft Polk	Ft Polk				32			4		
73	CPT	11A	Active	4			Germany	Germany			12	6			18		
74	CPT	12A	Active	10	x	5	Ft Hood	Ft Hood				12			42	yes	
75	CPT	11A	Active	4	x	4	Korea	Ft Hood			12			M-12		yes	
76	CPT	11A	Active	5	x	4	Germany	Germany		9				M-10		yes	
77	CPT	11A	Active	4			Hawaii	Hawaii									
78	CPT	11A					Hawaii	Korea				6			8	yes	RTO in ODS
79	CPT	ENG					Ft Bragg	Korea			8	15					
80	CPT	11A	Active	4			Germany	Germany			18				14		
81	CPT	11A	Active	4			Ft Bragg	Ft Bragg				18			19		
82	CPT	11A	Active	4.3			Ft Carson	Ft Carson									
83	CPT	11A					Ft Drum	Ft Drum			10				22		
84	CPT	11A	Active	4	x	4	Italy	Italy				12		AT-12	9	yes	rifleman
85	CPT	11A 3Z	Active	3.5			Ft Drum	Ft Drum			4			M-14	12		
86	CPT	11A	Active	7	x	2	Germany	Germany			9		10		18	yes	
87	CPT	11A					Germany	Germany			12	10				6	Albania

Table B-1. Background Information on Each Respondent (Continued)

Res #	Rank	MOS	Component	Years of Duty	If Guard?	Years of Duty	Latest Location	Earliest Location	Unit of Note	Co Cdr?	Co XO?	Staff	Spt Pln Ldr	Mortar /AT/ AA /Tank Pln Ldr	Rifle Ptn Ldr	Enlistd	Combat?
88																	
89	CPT	25A	Active	4.5			CONUS	Korea			12	12			12		
90	CPT	11A	Active	4	x	7	Ft Hood	Ft Hood			5	11			17	yes	
91	CPT	11A	Active	8			Ft Benning	Ft Benning	75th		15				25		
92	CPT	11A	Active	5			Alaska	Alaska				19		AT-12			
93	1LT	11A			x	6	Illinois		SF		24				12		
94	CPT	11A	Active	8			Alaska	Alaska				6	6		10		
95	CPT	11A	Active	4	x	6	Korea	Sandhill			16				7	yes	
96	CPT	11A	Active	5			Hawaii	Hawaii		11	13				22		
97	CPT	92B	Active	4.15			Ft Lewis	Ft Lewis			15	8			16		
98	CPT	11	Active	4			Ft Bragg	Ft Bragg			11				23		
99	CPT	13A	Active	4.5			Ft Bragg	Ft Bragg		12			12				
100			Active	4	x	2	Ft Drum	Ft Drum						M-17	16		
101			Active		x	4	Hawaii	Hawaii							36		
102	CPT	11A	Active				Ft Benning	Ft Bragg	75th		12			AT-10	10		
103			Active				Ft Bragg	Ft Bragg			10	13			17		
104	CPT	11A	Active	4			Germany	Germany									
105	CPT	11A	Active	4			Ft Bragg	Ft Bragg			6	14			15		
106	1LT		Thailand										8		36		
107	CPT	11A	Active	4			Ft Lewis										
108	CPT	11A	Active	4			Ft Campbell	Ft Campbell			12	12			24		
109	CPT	35D					Ft Huachuca	Ft Bragg				48					
110	CPT	11A	Active	4			Ft Bragg	Ft Bragg			21	1			10		
111	CPT	11A	Active	4			Ft Benning	Ft Benning			4			T-11/AT-12			
112	CPT	11A	Active	12.5			Germany	Ft Bragg	SF							yes	sqd ldr in ODS
113	CPT	11A	Active	4			Italy	Italy				12		M-15	10		
114	CPT	11A	Active	4			Germany	Germany			19				7		
115	CPT	11A			x	4	Hawaii	Hawaii			14	10			6		
116	CPT	11A	Active	4			Germany	Bosnia			24				13		Bosnia/Kosovo

Table B-1. Background Information on Each Respondent (Continued)

Res #	Rank	MOS	Component	Years of Duty	If Guard?	Years of Duty	Latest Location	Earliest Location	Unit of Note	Co Cdr?	Co XO?	Staff	Spt Pln Ldr	Mortar /AT/ AA /Tank Pln Ldr	Rifle Ptn Ldr	Enllstd	Combat?
117	CPT	11Z					Ft Riley	Ft Riley			19	3			13		Bosnia
118	CPT	11A	Active	4			Germany	Germany							32		
119	CPT	11A	Active	4			Hawaii	Hawaii			13				22		
120	CPT	11A	Active	13			Ft Bragg	Ft Bragg				12		M-6	6		sqd ldr in SWA
121	CPT		Active	4			Ft Carson	Ft Carson			24				8		
122		11A	Active	5			Germany	Germany			8	14			8		UN
123	CPT	12A	Active	4			Germany	Germany				6			18		Kosovo, Macedonia

Table B-2. Specific Respondents within Each Group

		Specific Respondents
Total Surveys Received	123	All
Eliminated Surveys	5	4, 6, 78, 97, 106
All IOAC	118	
MOS 11	84	1, 3, 5, 7, 8, 13-17, 21-22, 24, 27, 30-39, 41-44, 47-50, 52-59, 61-65, 67-70, 73, 75-77, 80-87, 90-92, 94-96, 98, 102, 104, 105, 107, 108, 110-111, 113-120, 122
non-MOS 11s	17	2, 9, 11, 12, 18, 28, 29, 45, 46, 71, 72, 74, 79, 89, 99, 109, 123
undefined MOS	9	19, 20, 40, 51, 88, 100, 101, 103, 121
USMC	2	10, 60
Special Forces Experience (MOS 18)	6	23, 25, 26, 66, 93, 112
75th Ranger Battalion Experience (any MOS)	8	16, 27, 33, 43, 52, 63, 91, 102
Combat/Peacekeeping Experience (any MOS)	21	3, 9, 21, 23-26, 31-32, 41, 50, 52, 60, 84, 87, 112, 116, 117, 120, 122, 123

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